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# CLIENT 1: A COMPUTER PROGRAM WHICH SIMULATES CLIENT BEHAVIOR IN AN INITIAL INTERVIEW

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## ABSTRACT

The objective of this research was to create a general computer program which simulates client behavior in an initial counseling interview. Through interaction with the counselor, a programmed client progresses toward the goal of verbalizing a specific problem statement. Client movement is a function of the simulated variables: threat value of counselor and client statements, strength of the relationship, and an index of counselor competence. The simulation project is valuable as a means of training and evaluation in counselor education and in studying counselor cognitive processes. It also provides an opportunity to test the sufficiency of an explicit set of theoretical constructs for explaining client behavior.



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Introduction

The format of this presentation follows this five part plan: (1) an introduction to the CLIENT 1 system to give an overview of our work together with some reasons for using computer simulation to clarify counseling theory, (2) a review of other systems which we will compare with our own, (3) a more concrete description of the CLIENT 1 program, (4) a brief outline of some implications of the use of computers in counselor training and research, and (5) discussion of our proposals for the continuing development of client-counselor interactive systems programmed for the computer. After our presentation Dr. Clyde A. Parker of the University of Minnesota will comment on the implications of our computer model.

CLIENT 1 is an attempt to model the process of counseling using a computer programming language. The simulation was developed from role-playing interviews and models a client who is reasonably verbal and motivated,and not overly resistant to describing his concerns to a counselor he can trust. This simulated client has a number of statements he can make about his work, his family, his relationships with others and his feelings. The counselor seats himself in front of a cathode ray tube (CRT) and keyboard and reacts to natural language statements made by the simulated client. These statements are organized into several topic areas, and statements within each topic are sequenced from least to most threatening to the client. The threat value of a client statement is dependent upon the threat values of the affect, content area, and person referenced in the statement. Based upon the statement the counselor has made, CLIENT 1 computes the threat value associated with the counselor's statement, an index of counselor competence, and an index of the strength of relationship between counselor and

client. Using these indices and an interpretation of the counselor's input, the client "decides" whether (a) to become more specific or general in the topic area he is discussing, (b) to change topics, or (c) to terminate the interview. Once the client's decision has been made, the appropriate statement is displayed on the CRT. The counselor's task is to move the client toward the verbalization of a specific and very threatening statement of the client's problem. Counseling progress is movement toward that problem statement through statements that are progressively more specific and more threatening. After each client statement the counselor constructs a statement and sends it to the client. The counselor constructs his statement by selecting six numerical codes which refer to a counselor lead, the affect, content area and person references which he wishes to include in his message, plus several connectives used in message construction. The system takes the coded information and creates the counselor's message on the CRT. For instance the counselor's reflection of a client statement might be YOU FEEL GUILT ABOUT FEELINGS FOR SECRETARY. YOU FEEL is the lead, GUILT is the affect, FEELINGS is the content, and the client's SECRETARY is the person referenced in the statement (see Table 1).

The counselor has flexibility in communicating affect to CLIENT 1. He may choose a highly specific affect name or he may choose a general affect statement, like ALL WOUND UP INSIDE. The program has an affective dictionary from which the counselor can request either a general sampling of affect statements or a number of affect statements associated with the particular affect which the counselor believes is most appropriate. The counselor's decision to choose a more general or vague affect statement can cause his statement to have multiple interpretations, for an affect statement can be associated with more than one affect. This

unique aspect of the program is significant, since it simulates the realistic situation in which a client's interpretation of a counselor's statement may differ from the counselor's intended message.

After the counselor has encoded and transmitted his statement, the client program immediately tests the counselor statement to see whether it is a reflection. A counselor statement is a reflection if and only if it is a subset of the client's last statement, i.e. it contains no affect, content, or person reference which is not present in the client's statement. Reflections which are not too threatening will generally cause the client to move on to more specific material. If the counselor's statement is not found to be a reflection, the statement is considered to be a probe or interpretation. If the counselor's probe is not too threatening, the client searches through all the possible statements he can make to see if any are a subset of the counselor's statement. If such a client statement is found which is not too threatening, it is displayed on the CRT. If several statements are appropriate, the client has decision rules for choosing which statement will be displyed on the CRT. Whenever a counselor statement is too threatening, regardless of whether it is a reflection or a probe, the client will usually move to more general material or change topics.

The series of exchanges between the live counselor and the simulated client continues until the client has verbalized his specific problem statement or until a pre-determined number of counselor inputs have been made or until the high threat value of the counselor's statements and the low values for both strength of the relationship and the counselor's expertise cause the client to terminate the interview. The counselor's success can be determined by the number of counselor statements needed to reach the goal of the client's problem statement, by the strength

of the relationship at the termination of the interview, and by other criteria.

We will be more specific about the computer program later in the presentation, but perhaps this introduction provides enough basis so that we can now discuss some of the rationale for our efforts.

Cognitive psychology has given us some indications of the limitations of the human mind. A look at the attempts by behavioral scientists to formulate comprehensive and detailed theories of human behavior confirms that these scientists are constrained by these limitations. As human information processing systems themselves, counseling theorists have been forced either to be very general in their attempts to formulate complete explanations of complex counseling systems, or to be concerned only with very limited subsystems if they wished to formulate detailed explanations. But the psychologist must attempt to provide general explanations of counseling (or of any significant behavior in the natural environment) at a level of maximum completeness and of maximum detail. To accomplish this implies the creation of a system of variables interacting in such complex ways that the human information processing system is inadequate to test the implications of the model or to see whether it represents a sufficient explanation of complex counseling phenomena. The computer becomes a logical tool in this endeavor, as it can store and manipulate a large number of variables and keep track of the interactions among them. If necessary, complexity can be maintained throughout a system; there is no need to simplify matters just so that the human can think about them.

We can also characterize the peculiar nature and strengths of the explanations which computer simulations provide. The explanatory statement is in the computer program itself, and therefore, the

statement must be specific and unambiguous. Such explanations generally speak to a "sufficiency" rather than a "necessity" test. If the computer program models psychologically plausible mechanisms and if its output closely approximates human behavior, then the computer program is a sufficient explanation of the psychological processes and the behavior dependent upon those processes. The explanation may not be the most economical one; it may not be the most artistic one, but it is sufficient to explain the processes and the behavior.

## Review of the Literature

Six areas of computer research which are related to our project are: (1) question-answering/natural language programs, (2) guidance information retrieval systems, (3) programs utilizing computational linguistics to simulate therapeutic interviewing, (4) personality model simulations which are not interactive, (5) simulations of human problem-solving, and (6) interview simulation utilizing personality models and man-machine interaction. We are not interested in defining mutually exclusive categories; this organization is intended only to further the reader's understanding of just where our simulation fits with respect to some other research and development efforts with computers.

Because interview simulation depends on communication using English phrases or sentences, the present research is related to the question-answering/natural language analyzing programs (we shall refer to them as question-answering programs). These programs probably comprise the largest group of computer programs which generate English output in response to English input. They have been designed for a multitude of purposes and many have been reviewed by Frijda (1972) and Simmons (1965). An example of an extremely sophisticated effort is Winograd's (1971) robot project developed at M.I.T. Many of these question-answering programs are directed toward natural language analysis, deduction, and inference in order to produce the most accurate reply possible to the question. A major difference between the thrust of our research and these programs is that once CLIENT 1 has found the "answer" which is most relevant to the input, there is no guarantee that the response will be output. CLIENT 1's "personality" might cause a different and possibly unrelated response to be selected for output. Question-answering systems cannot be described as having a "personality." They emphasize correct reasoning and analysis

while we have emphasized the role of emotions and the relationship between the user and the program.

A second category of programs has been concerned with retrieving information that could be useful in vocational and/or educational decision-making and planning. They interact with a person, performing some of the functions that a counselor might. For example, AUTOCOUN by Loughary, Friesen, and Hurst (1966) has been used in educational planning to help high school students make course selections in the light of predictions about their success in various curricula. An example in the area of vocational guidance would be the Information System for Vocational Decisions (ISVD) by Tiedemann, Davis, Durstine, Ellis, Fletcher, Landy and O'Hara (1970). These programs differ from question-answering programs in that they emphasize accurate and extensive information about occupations, educational opportunities, and student characteristics rather than the analysis of natural language input, deduction, and inference. As with question-answering systems, these programs do not have a personality. They are single-minded in their efforts to deliver the most accurate information they can to the user. The guidance information retrieval programs do simulate some of the behavior of a counselor, but they do not deal with the ingredients which cause a counselor to accept or reject, support or punish, hear or not hear a client. Their purpose of giving accurate information is different from our own.

A third type of program has been designed by Weizenbaum (1966) and researched to some extent by Colby, Watt, and Gilbert (1966). The Weizenbaum program, ELIZA, which some have termed a "mad doctor" program, has been used to simulate a psychiatrist in an initial interview. We do not class ELIZA as a question-answering or information retrieval

program because it has neither the language and reasoning power of the former nor the extensive information of the latter. ELIZA-type programs are exercises in what has been called "computational linguistics." The computer's output for the most part is a function of the previous input. The input phrase or sentence is searched for key words, and depending upon which ones are found, certain rewrite rules can be applied which transform the input into an output (for example, YOU might be transformed to ME and I to YOU such that an input of I LOVE YOU would be rewritten as WHY DO YOU LOVE ME). At times the program appears to be reflecting a patient's statement or appropriately probing for more information. If no key words are found, a "no knowledge" reply can be emitted such as PLEASE GO ON. There is little cumulative effect in the program. Changes in affect variables or beliefs do not result from the interaction with the patient. Again, it is the lack of personality variables which causes ELIZA to be different from our work. (We should point out that the ELIZA design can be used in other ways. Tiedemann used an ELIZA-type program in conjunction with ISVD information bank.)

A fourth category of computer programs has dealt with personality models. Examples would be the work of Ableson and Carrol (1965), Colby and Gilbert (1964), and Loehlin (1963). Reviews of these models can be found in Loehlin (1969) and Tomkins and Messick (1963). These programs simulate such processes as how belief systems change and how neurotic defense mechanisms (e.g. displacement) are triggered as a function of emotions. They have little in common with the previously mentioned programs, but the variables and methods they used are very relevant to the simulation of interview behavior. However, none of these systems utilizes "real-time" communication between the human and

the computer. Man and machine do not interact and no output is produced which can be directly compared to observable human behavior. In this respect, these programs are dissimilar to CLIENT 1.

The fifth category contains the information processing approach to human problem-solving. Central to the work in this area have been the contributions of Allen Newell and Herbert Simon at Carnegie-Mellon University. Newell and Simon (1972) review the work in this area and present a detailed description of their own research. Like the personality simulations, many of the computer programs developed to simulate problem-solving have not emphasized natural language analysis. (An important example is the General Problems Solver (GPS), Newell and Simon, 1972.) These programs have been concerned with the cognitive processes involved in achieving a goal, for instance proving a logical theorem or winning a game of chess. As with the first three categories, the programs have no personality attributes. We have mentioned the work in problem-solving because we view the counselor and client as being problem-solvers. Both attempt to formulate and achieve a series of subgoals on the way to some final goal state. To be sure, the problems which confront the counselor and client are seldom well-defined or well-structured; they differ from formal games like checkers and chess. But the many interesting findings in problem-solving (e.g. the use of heuristics) and the increasing attention to ill-structured problems (Newell, 1969; Eastman, 1969) make this area relevant to our own efforts.

The programs in the first five categories have made important contributions to the simulation of human behavior. Each is a part of that growing and evolving aspect of computer simulation which forms the background for our research. We shall review the sixth category, interview simulation utilizing personality models and man-machine interaction,

in some detail since it includes simulation efforts which are similar to the present project in purpose and, in some instances, procedures. Included in this last category are works by Bellman, Friend, and Kurland (1966), Starkweather,Kamp, and Monto (1967), and Colby, Weber, and Hilf (1971).

The Bellman group was interested in simulating a patient in an initial psychiatric interview. They viewed both the live therapist and the computerized patient as being involved in a multi-stage decision making process. Bellman had been working in operations research; in particular, he is known for the development of a technique called dynamic programming. Dynamic programming is an adaptive multi-stage decision-making process which allows for the continuous cycling of cumulating information back into the decision making process. In applying this concept of dynamic decision making to the psychiatric interview, he thought of the therapist and patient as two sequential machines interacting as they accumulate information about each other. The information exchange results in mutual adaptive modifications in the responding policies, objectives, and decision rules of each.

While Bellman et al. are explicit in delineating their view of the psychiatric process, their published description of the simulation of that process is sketchy. We do know that at each step of the interview the simulation provides the therapist with three alternative questions to ask and that for each question the patient has three possible responses. A probability model was used to select which of the three responses would be output. Without degrading the basic concepts of interaction between the patient and the therapist proposed by Bellman et al., we still recognize the simulation as limited given its simple tree or

branching format. There is, as they point out, an enormous difficulty in composing and storing a tree of possible questions and answers. As a function of the length of the interview, the number of alternative questions and answers grows quite quickly. Despite these limitations, the model is recognized as a legitimate first step (which we tried ourselves) in the simulation of therapeutic encounters. Unfortunately, Bellman and his associates do not seem to have continued this work, and others have not followed the branching format.

An attempt to simulate both patient and therapist behavior is that of Starkweather, Kamp, and Monto (1967). No specific psychological model has been proposed for these simulations, and they are primarily based on Starkweather's (1965) earlier work on the development of a computer language which would facilitate the writing of simulations. The language, COMPUTEST, although general and allowing for natural language communication by means of a key word search procedure, is cumbersome in complex situations which require questions and answers about feelings and beliefs. COMPUTEST's other major drawback is that it only permits movement forward through a sequence of commands; it contains no provision for a return to previous material. Despite these limitations, a gain in Starkweather's program is that two computer programs, one for the patient and the other for the therapist, can interact in real time. The limitations of the COMPUTEST program language, however, are obvious in these client-counselor interactions and at present the program cannot fulfill the demands of an "uninitiated" therapist who wishes to probe, reflect or interpret to the patient.

The last simulation involving personality models and man-machine interaction which we would like to discuss is the one developed by

Colby and his associates at Stanford. Colby has published on simulation for more than ten years. His work includes models of neurotic belief systems (Colby and Gilbert, 1964) and research with programs similar to Weizenbaum's ELIZA (Colby, Watt, and Gilbert, 1966). In a recent article which we learned about after the development of CLIENT 1, "Artificial Paranoia" (Colby, Weber, and Hilf, 1971), a simulation of a psychotic personality is described which has a number of similarities to the CLIENT 1 program. The similarities are striking in some ways, and they are, we hope, a function of two independent research groups each finding a "good solution" to the problems involved in creating a natural language, dyadic, real time, interactive, system in which beliefs and affects are stored.

Colby et al.'s present system is a first approximation of a simulated psychiatric interview with a paranoid patient. It incorporates some of Schank and Tesler's (1969) formulations for a natural language program and for conceptual nets, or semantic memories, for the storage and association of the client's paranoid ideation. In this system, therapist statements are entered as natural language via teletype and are scanned by the simulated client for matches to key words. Combinations of key words form "concepts" in the client's conceptual net. In searching his (the simulated client is male) memory for a relevant response, the client continually considers the input statement made, the state of the interview variables, and his own affect variables.

We are uncertain about the program's sophistication in natural language communication. At present it seems that therapist input is handled by key word identification without regard to the syntax used. The possibilities for misunderstanding in this key word recognition

system are obvious. With regard to output from the simulated client, Colby et al. state that many of the responses "exist for the most part as such in the data." This output may be solely stored-text output or it may be that a simple grammar exists for generating some output statements. Regardless of the sophistication of the present program in dealing with natural language, the attention to the work of Schank and Tesler holds promise for future development. Colby and his colleagues (Colby, Hilf, Weber, and Kraemer, 1971) have also spent time in evaluating the goodness of their simulation as a reproduction of the interviewing situation. They have evidence which supports the effectiveness of their simulation.

The CLIENT 1 Model

As CLIENT 1 is discussed, it is important to recognize the model as idiographic--there is no pretention on our part of having built a model which is representative of "client behavior in general"; it is, rather, a plausible model of an individual client. However, efforts have been made to avoid at least obvious inconsistencies with recognized empirical findings on client interview behavior, and to the extent that CLIENT 1's output achieves correspondence with modal client behavior, the program represents a realization of an explicit (albeit somewhat limited) theory of client behavior.

The CLIENT 1 program has been written in FORTRAN and operates on a CDC 6400 time sharing computer. At the present time, the program requires approximately 35,000 central memory locations for its operations, and it requires the availability of disk packs.

The program was designed to be fairly general, providing for the possible simulation of a wide variety of different clients by simple modification of stored text and various client variables. It is dimensioned to permit storage of up to 100 different client statements and up to 100 different affect statements. At present, only 32 client statements and 87 affect names and affect statements are being utilized.

With regard to the 100 locations dimensioned for affect statements, twenty of those locations are reserved for specific affect names (e.g. ANXIETY, GUILT, LOVE) ; the remaining 80 locations are provided for storage of "affect statements." These statements and their function in CLIENT 1 are a unique aspect of this simulation model. Drawing from the work of Davitz (1969) on the language of emotion, we have been able to provide both the client and the counselor with verbal expressions of affect beyond that of mere statement of the affect name (e.g. ALL WOUND UP INSIDE instead of FRUSTRATION). Just as important as the flexibility and diversity

in communication which this provides are the multiple interpretations (and thus misinterpretations) of the expressed affect which are possible. The affective expressions vary in the degree of recognizability of the affect referent (see Davitz, 1969), and they may refer to, "or load on," a number of different affects. In the example given, ALL WOUND UP INSIDE while connoting FRUSTRATION might also be interpreted as an expression of ANXIETY, LOVE, or ANGER. This possibility of multiple interpretations by either the client or counselor is clearly an aspect of real life human communication.

As the program allows for inclusion of up to 20 different affects, it also permits up to 20 different content areas (e.g. WORK,RELATIONSHIP(S), FINANCES) and 20 different persons (e.g. WIFE, SECRETARY, BOSS) to be referenced. Of these, 11 affects, 7 content areas and 10 persons are currently included in the CLIENT 1 program. While actual client statements do not reference or make use of all possible affects, contents, and persons, and their possible combinations, all are available to the counselor for his statement construction.

Each affect, content, and person is assigned a threat value in accord with the particular client one wishes to simulate. Affects range in threat value from 1 to 10. Affect statements, which range in specificity (recognizability) from 3 (least specific) to 10 (most specific, i.e. the affect name) have a threat value determined as a function of their level of specificity and the threat value of the affect on which they load:

AFFTHR * level of specificity/10,

where AFFTHR is the threat value associated with the affect. As noted earlier, affect statements may load on a number of different affects (possibly having a different level of specificity for each) and

as such may have a number of different threat values associated with them. In such instances where multiple interpretations are possible, the threat value of the affect statement is that value computed given the client's interpretation of what affect is being referenced. The essential point is that interpretations of affect statements are from the point of view of the client, not from the point of view of the counselor.

Threat values associated with the different content areas range from 1 to 5; and for persons, from 1 to 10. Any combination of affect (or affect statement), content, and person may potentially be referenced in a client and counselor statement. One or more statement items (affect, content, or person) must be included in a statement, allowing the threat value of the statement to range from 1 to 25.

The threat value of a client or counselor statement, then, takes on a value according to the function:

THREAT VALUE = (AFFTHR * level of specificity/10) + CONTHR + PERTHR

where AFFTHR: threat associated with affect
CONTHR: threat associate with content area
PERTHR: threat associated with person

The threat value of counselor statements is increased by a constant (THREAT VALUE * 1.2) when the manner of leading into the statement is like that of a "probe":

TELL ME ABOUT . . .

Selection of a "reflective" lead:

YOU FEEL . . .

YOU'RE TELLING ME ABOUT . . .

produces no change in the threat value of the counselor statement. All statements to the client may be "qualified" or made tentative if so desired by adding appropriate qualifiers to the counselor lead:

I'M NOT SURE, BUT I THINK . . .

(a) YOU FEEL . . .

(b) YOU'RE TELLING ME ABOUT . . .

I THINK IT WOULD BE A GOOD IDEA IF YOU COULD . . .

(a) TELL ME ABOUT . . .

The addition of a statement qualifier reduces the overall threat value of the counselor's statement (THREAT VALUE * .9).

The total threat value of any counselor statement then is the combined function the threat values of the affect (or affect statement), content area, and person referenced in the statement, the type of statement lead used, and whether or not the statement is qualified.

Given this basic information on the client and counselor statements, it is pertinent now to discuss in more detail the assumptions around which the model was developed and the operation of the model. We have defined our client to be a reasonably intelligent and verbal young man, who is aware of what it is that is troubling him, and who is not overly resistive to discussing his problem. He is motivated to describe his concerns to a counselor whom he can trust. In addition, we have assumed the following: (1) this client has a finite number of topics to discuss; (2) these topics are not of equal importance in relation to his primary concern; (3) each of the topics may be viewed as comprised of a set of statements which can be ordered sequentially from general to specific with regard to the information communicated about a topic (i.e. statements focus in on particular topics); (4) each statement the client may make has a threat value associated with it; and (5) as statements become more specific and focus in on the concern, the threat value of the statements increases. As a function of (a) the threat values, (b) the strength of relationship (level of trust) between the counselor and client, (c) the threat value of the

counselor's statements to the client, and (d) the key words referenced in the counselor's statements, the client will (1) get more specific in his statements, (2) get more general in his statements, (3) stay at the same level of statement specificity (i.e. same level of threat), (4) change topics, (5) refuse to discuss a given topic anymore, or (6) terminate the interview.

Following from these assumptions, client statements are grouped by "topic areas" and arranged sequentially from most to least threatening within each area. The topic areas themselves are sequenced from most to least threatening in accord with the threat of their member statements. The "problem statement" is defined as the statement of greatest threat value; its topic area is the "problem topic"--other topics are "non-problem topics." While the program allows up to ten topics, the currently operating client has only three areas for discussion--each with a different number of statements for output.

The counselor's task when interacting with the client is to establish sufficient trust (increment the strength of relationship) and facilitate client movement to the point where the client is able to verbalize his problem statement. Client movement may occur in either of two ways. First, the counselor may attempt to reflect to the client what he has just said. Given the flexibility of affect statements, numerous paraphrases (reflections) of the client's statement are possible; however, different affect statements will be interpreted by the client as being differentially threatening, and too threatening a statement (where threat is greater than the existing strength of the relationship) may result in a decrement in the level of trust between the client and counselor and may precipitate client regression to less threatening and more general statements and/or topics. If the reflection is not too threatening, the

client will follow his own "game plan"--generally, a gradual and sequential unfolding of the client as he approaches verbalization of the problem statement (See Table 2). Second, the counselor may introduce new material--material which is not particularly related to what the client has just said. This may happen unintentionally, as a result of misinterpretation of the client's statement, or intentionally by playing a "clinical hunch." From the client's standpoint, this is interpreted as a probe, and rather than elaborating on what he has been discussing, the client attempts to associate to what the counselor has said. If the counselor's statement has not been too threatening (i.e. greater than the strength of the relationship) and the client is able to find an association to the counselor's statement which itself is not too threatening, the client will make that statement. If the client has several statements he can make in response to the counselor's probe, the most complete and informative statement will be output. If the client is unable to make any associations to the counselor's statement which he is willing to state, he appears bewildered and may simply repeat what was previously said or even back up to a more general type of statement.

These two systems for client movement within the interview, the generally sequential progression toward the problem statement (reflection) and the client association system (probe), have been labeled TRACK I and TRACK II, respectively. Flow charts of their operations individually and their functioning within the CLIENT 1 system as a whole may be found at the end of this paper (see Figures 1, 3, 4).

So far we have focused on client movement which is, in part, a function of the threat values associated with counselor and client statements. Any movement is also dependent upon the strength of the relationship

between counselor and client. It is to this variable and a number of other "intervening variables" that we will now direct our attention.

In the simulation, we have equated the strength of the counseling relationship with the level of the client's trust in the counselor, and in defining the client as generally non-resistive, we have assumed a certain amount of initial trust on the part of the client. As the counselor responds in the interview, the client is continually reevaluating that trust level--it may increment or decrement depending on how "good" the counselor is in the interactions with the client. How "good" a counselor is--his expertise--has been defined as a function of (a) his "accuracy" in reflecting what the client said (if TRACK I) or what he has facilitated the client to say (if TRACK II) and (b) his "appropriateness," whether his statements are less than or equal to the existing strength of relationship. The "good counselor" (GC) variable may range from -9 to +9; strength of relationship (SR) may range from -6 (termination) to 30 (MAXSR). Various points along the SR continuum have been specified for use in the client movement rules(see Table 2): low trust (LT=5), adequate trust (AT=15), and high trust (HT=25). These anchor points, as well as those ranges specified above, may be modified in the program for variations in client types.

Specifically, the strength of the relationship, which is determined at each counselor-client exchange, is:

$$SR = SR + (GC * W1)$$

where SR: strength of relationship
W1: fractional constant
GC: "good counselor"

and GC = APP * ACC

where APP: appropriateness

APP(TRACK I) = 7 if threat value of the counselor is less than or equal to SR, otherwise -7

APP(TRACK II) = -7 if threat value of the counselor statement exceeds SR

-3 if threat value of the counselor statement is less than SR but no associations are found

-1 if threat value of the counselor statement is less than SR and an association is found, but none which is less than SR

and ACC: accuracy

ACC = [(AFF * level of specificity) + CON + PER]/14 * C1 * C2

where AFF = 1 if acknowledged, 0 otherwise
CON = 2 if acknowledged, 0 otherwise
PER = 2 if acknowledged, 0 otherwise

and C1 = 1.2 if counselor lead (3), 1 otherwise
C2 = .9 if statement is qualified, 1 otherwise

A "benefit of the doubt" factor has been provided on the first several exchanges in order to accommodate for a few counselor "faux pas" in the early part of the interview as he is "getting to know" the client:

IF (NST is less than or equal to 4) SR = SR + .33

where NST: number of counselor statements

Beyond the first four exchanges, the counselor may be punished for repeated ineptitudes:

IF (AVER is less than -5 and SR is less than LT and NST is greater than or equal to 4) TERMINATE,

where AVER is the average of last 4 GC values.

Let us now discuss in more detail how the counselor is to communicate with the client. Quite simply, the counselor selects from among available counselor leads (LE), affects and affect statements (AF), content

areas (CO), and persons (PE) to construct his message. Two digit code numbers are entered by way of the CRT keyboard according to a simple "grammar," using selected prepositions (PR), which are also entered as code, as connectives within the statement. The counselor may choose to qualify the statement or not. After each client output, the system instructs the counselor through the series of steps for generating the counselor statement. After entering the statement code, the verbal representation of the statement is displayed on the screen; the client then responds, and the process begins again. Figure 2 is a flow chart of the statement generation sequence. Should the counselor select to view affect statements from the affective dictionary, he may or may not choose to select a particular affect area (e.g. "love" statements or "anxiety" statements). If the preference is not to choose a given affect area, the counselor will receive a sample of affect statements drawn from each affect area. If an affect area is stipulated, the counselor will receive only affect statements loading on the specified affect. The Appendix contains an example which illustrates how counselor statements are generated and also two excerpts from "interviews." In the first interview excerpt the counselor quickly focuses on the client's real concern, while in the second the counselor is less effective.

Training and Research

CLIENT 1 has attributes that lend themselves to specific training attempts. The attributes are generality, explicitness, durability, accuracy, and consistency.

The generality of the CLIENT 1 model allows the trainer to simulate a wide variety of client verbal behaviors and to report a number of symptoms or diagnostic signs from the client's data base. The generality of the model also allows for the variation of a number of client variables. The client, for instance, can be programmed for high or low initial trust. The symptoms can be for specialized counseling in terms of a need for occupational information, desensitization, or operant shaping of skills. The gains for training in this ability to program a number of client types are: (1) that it allows counselor trainees to understand the range of clients that they will probably see and (2) that the variety of training clients enables counselor educators to do in-service retraining of those counselors who have received a limited training in the past. The counselor trained only to recognize talent and send bright achievers to college can be retrained (or retrain himself) to recognize and serve the various unmotivated or fearful or disruptive clients that he might now avoid in his counseling practice.

The explicitness of CLIENT 1 allows the student as well as the researcher to test variations in counseling theory. Students in counseling are often enjoined to "develop" their own model of counseling. The explicitness of the CLIENT 1 model makes that injunction a real test for the first time. As long as the student is instructed to develop a word description of his own model and to test that description against a word description of a class of clients, he is unable to generate a real test of the efficacy of his model. The student taught to develop his own

scenario for a standardized client or to program changes in a client which will make his proposed scenario work has tested his theory in a genuine way. Either the client is recognizable or he is not. Either the counselor's behavior moves the client to a faster identification of his concern or it does not.

The durability of simulation programs was a prime reason for our initial investment of time in the model. Horrified by our students' initial attempts to counsel each other in role playing simulations, knowing the ways in which they rapidly fell into "bad" counseling habits even under constant supervision, and wanting to slow down the initial practicum attempts so that the students could break down the counseling skills into their component parts, we were desperate for clients who could both pace the initial counseling contacts and endure the beginning students' mistakes. CLIENT 1 is able to do both those things and to relieve us of the ethical quandaries we lived with as we subjected undergraduate students in beginning psychology classes to our students' tender care. CLIENT 1 is patient and, in its patience, kind. Yet the CLIENT 1 program can be made simple or complex and can contain minimal standards for performance which make it impossible for the beginning counselor to fall into bad habits. The student rapidly learns the value of staying in the reflective mode until he has good data and of phrasing interpretations in tentative ways as well as the gains and losses of being explicit in identifying client affect.

To the extent that CLIENT 1 is an accurate model of a person, the man-machine interaction will be real. In fact, several counselor educators became extremely involved when they counseled CLIENT 1 and exhibited very real affect while puzzling over their next response to the client. Without exception, those faculty and students who have counseled CLIENT 1 in its

present form report that they feel an involvement with the program and that their counseling skills are challenged.

It is with the consistency and the standardization of CLIENT 1 that the greatest opportunities for training lie. Imagine yourselves as trainers about to model basic counseling skills. With recruited or real clients you have never been able to assure yourself that you will demonstrate the kinds of behaviors that you want to demonstrate. With CLIENT 1, you can practice your modeling procedure and know that the same parameters will exist when you make your demonstration. You can stop the process to discuss the heuristics used in choosing your next response. When students practice on CLIENT 1 they will be practicing on the same client, not the same client at different points in time. When a student makes a mistake he can get immediate feedback from the client that he has made an error; he can set the program so that he will get a read-out of scores on values like the strength of relationship after every response in the program. Remember that the CLIENT 1 program is also a general one; the student does not need to learn on just a single client or a single set of client parameters.

These training functions are inherent in CLIENT 1 as it is presently structured. In addition to using CLIENT 1 as a training device, we are also using it as a research instrument. CLIENT 1 presents a standardized task environment for counselors. We have already begun collecting protocol data from experienced counselors who "talk out loud" as they make decisions concerning what to say next to CLIENT 1. These protocols are being studied so that we might learn more about the cognitive processes involved in counseling. Perhaps at some point we will be able to make explicit statements, empirically based, about the programs and data which effective counselors employ when dealing with clients.

## Where Do We Go From Here

At this point we have described the CLIENT 1 model in some detail and compared it to other models. The model is explicit and unambiguous. It is unique in being a real-time interaction with a "normal person" who uses affect variables in order to structure the ongoing process. CLIENT 1 is related to information processing research, to question-answering natural language programs, to non-interactive personality models, to simulations of interviewing using computational linguistics, and most particularly to interview simulation involving both personality models and man-machine interaction. With some optimism we look forward to the potential of CLIENT 1 for training and to its use as a task environment in the study of counselor cognitions. Without cynicism or pessimism we also look candidly at the shortcomings of this model. While its surface behavior is in many ways plausible, many of the internal machanisms, particularly data storage and retrieval, are not psychologically plausible in terms of what we know of human beings.

We are presently trying to design a system which has a more plausible human memory structure and more powerful language capabilities. We want the system to be able to learn new facts and learn how to do new things. Such a system, whether it simulates a client or a counselor, will be able to change over time, from interview to interview. With such a system various therapeutic interventions can be studied and their effectiveness modeled.

In order to move forward with more sophisticated simulations of client and counselor behavior, it will be necessary for counseling psychologists to become more technologically sophisticated. There is a growing knowledge in the areas of human problem-solving and in certain areas of artificial intelligence which can be applied to the counseling

setting. Suggesting what some of these areas are in a sense defines some of the components that we now believe should be a part of advanced simulations.

In the area of simulating human long-term memory, there have been successes in an area known as semantic information processing. A major development in this area is the creation of memory nets in which various concepts are linked together, or associated. Information can be easily placed in a net and linked to existing information. These memory nets are losely organized and can be entered at any point. Searches for information in the net can be accomplished using simple commands. Stewart Shapiro (1971) at the Univeristy of Wisconsin has designed a system entitled "Mind" for semantic information processing and Schank and Tesler (1969) at Stanford Research Institute have been dealing with somewhat similar conceptual nets. Both appear to be useful models for human long-term memory. If, in addition, variables which seem to affect recall (e.g. activation indices, see Frijda, 1972) are made functional in semantic net structures, realistic simulations should be possible. The models which they have developed could also be used to organize information in a working memory that would have a shorter life than long-term memory.

Another area concerns "fuzzy" logic, which some researchers in artificial intelligence see as being much more human-like than the two-valued logic that has been popular in applications of the predicate calculus (e.g. theorem proving machines). Lee (1971) has proved several useful theorems in the area of fuzzy logic, while Colby, Tesler, and Enea (1969) have actually done some simulation research on belief systems which use "many-valued" beliefs, a close relative of fuzzy logic. Human beings hold many beliefs as neither false nor true; they assign to them

a degree of credibility.

In addition to the deductions possible in fuzzy logic, human beings are also capable of induction, the ability to make some general statements based on specific instances. There have been efforts to model some of this behavior, and they are seen as potentially providing a necessary component for any attempt to simulate the full spectrum of human reasoning (Becker, 1969).

As mentioned earlier, many of the problems that humans deal with could be defined as ill-structured problems, problems for which there is no well specified goal (Eastman, 1969). Human beings can and do design solutions to these problems. They can create plans of action which move them closer to their goal (however vaguely described). Being able to develop and execute plans in real-time relates to an area of artificial intelligence research called "programs which write programs" (Waldinger and Lee, 1969). The successes in this area have been limited, but the ability to develop a plan and execute it in real-time is a human capability that we see as potentially simulatible.

Finally, the natural language capability of human beings must be better simulated if our counseling simulations are to be effective. As mentioned earlier, Winograd (1971) has developed an extremely powerful robot program which emphasizes natural language understanding.

In order to carry out effective counseling simulations, then, the researcher will have to combine and integrate several areas (fuzzy logic, semantic nets, induction, programs which write programs, and natural language) with an understanding of the nature of and the approach to solving ill-structured problems. These components combined with a personality which includes attention to beliefs and affects can come together to produce evermore lifelike models to be studied.

These models will have to be evaluated. Their behavior will have to look real to those who observe it, and their internal workings will have to be psychologically plausible. As new facts are learned or inadequacies discovered, models will need to be upgraded. In the area of counseling, we see a cyclical process in which models are designed, programmed, simulated and then empirically compared to human behavior. When necessary, the model would then be redesigned, reprogrammed, and so forth. Empirical trials with humans to test the reasonableness of the model hold promise for truly lifelike simulations which will in turn be rich laboratories for studying human behavior. The techniques of Colby, Hilf, Weber, and Kraemer (1971) using machine-mediated interviewing to carry out indistinguishability tests will help us test the superficial behavior, while the internal workings of the program will have to be compared with results from experimental psychology and our own introspection.

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TABLE 1
COUNSELOR STATEMENT ELEMENTS

| DO YOU WISH TO QUALIFY? (YES) | COUNSELOR LEAD (LE) | AFFECT OR AFFECT AREA (AF) | PREPOSITION (PR) | CONTENT (CO) | PERSON (PE) |
|---|---|---|---|---|---|
| | 1. YOU FEEL... | 1. AFFECTION (5) * | 1. ABOUT | 1. RELATIONSHIP(S) (5) | 1. YOURSELF (6) |
| I'M NOT SURE, BUT I THINK... | 2. YOU'RE TELLING ME ABOUT... | 2. SHAME (9) | 2. TOWARD | 2. PROBLEM(S) (1) | 2. SECRETARY (10) |
| | | 3. IRRITATION (1) | 3. FOR | 3. FEELINGS (5) | 3. WIFE (7) |
| | | 4. DISLIKE (1) | 4. WITH | 4. FINANCES (2) | 4. CO-WORKERS (5) |
| I THINK IT WOULD BE A GOOD IDEA IF YOU COULD... | 3. TELL ME ABOUT... | 5. FRUSTRATION (2) | 5. TO | 5. WORK SITUATION (2) | 5. BOSS (4) |
| | | 6. ANXIETY (5) | 6. BY | 6. SUPERVISOR ROLE (3) | 6. CHILDREN (1) |
| | | 7. SADNESS (7) | 7. FROM | 7. BEHAVIOR (1) | 7. COUNSELOR (5) |
| | | 8. REMORSE (8) | | | 8. FRIEND(S) (2) |
| | | 9. GUILT (10) | | | 9. SECRETARIES (5) |
| | | 10. LOVE (9) | | | 10. FAMILY (1) |
| | | 11. DEPRESSION (2) | | | |

* Values in parentheses are the threat values corresponding to the affect, content, or person.

TABLE 2
CLIENT MOVEMENT DECISION RULES

IF (GC less than -1 and SR less than AT) MOVE 1 STEP MORE GENERAL

IF (GC less than -3 and SR less than LT) MOVE 2 STEPS MORE GENERAL

IF (GC less than -5 and SR less than LT) MOVE 3 STEPS MORE GENERAL

IF (GC less than -5 and THRCL - SR greater than or equal to SR) CHANGE TOPICS (next jump negative)

IF (AVER less than -5 and SR less than LT and NST greater than or equal to 4) DELETE TOPIC AND CHANGE TOPICS (next jump negative)

IF (all non-problem topics have been deleted or if problem topic has been deleted) TERMINATE INTERVIEW

IF (SR less than -6 and NST less than or equal to 10, or SR less than 0 and NST greater than or equal to 6) TERMINATE INTERVIEW

IF (GC greater than or equal to 2.9 and SR greater than THN, or GC greater than or equal to 7 and SR greater than AT and SR less than THN) MOVE 1 STEP MORE SPECIFIC

IF (GC greater than or equal to 5 and SR greater than AT and SR greater than THN) MOVE 2 STEPS MORE SPECIFIC

IF (GC greater than or equal to 7 and SR greater than HT) MOVE 3 STEPS MORE SPECIFIC

IF (SR greater than HT and client on a non-problem topic) CHANGE TOPICS (next jump positive)

where
AT: adequate trust
LT: low trust
HT: high trust
SR: strength of relationship
GC: "good counselor" index
AVER: average of last 4 GC
NST: number of counselor statements
THN: threat of next client statement in sequence
THRCL: threat to client (threat of counselor statement)

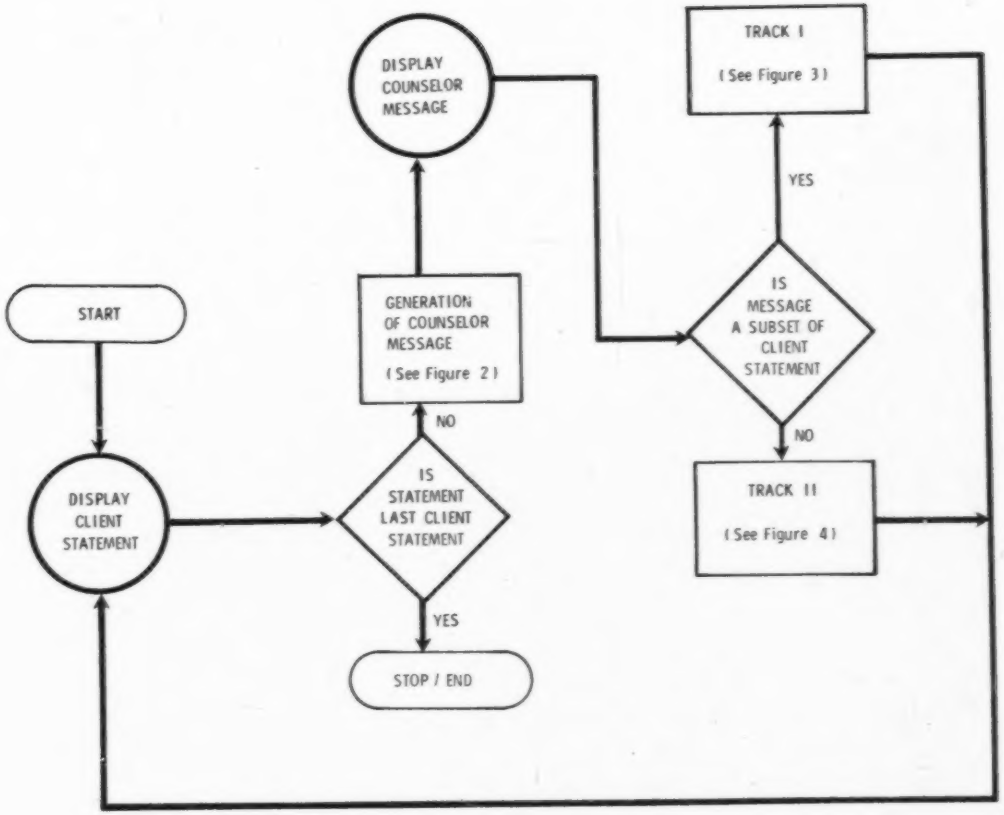


**FIGURE 1:**

**FLOWCHART OF CLIENT PROCESSING SYSTEM**

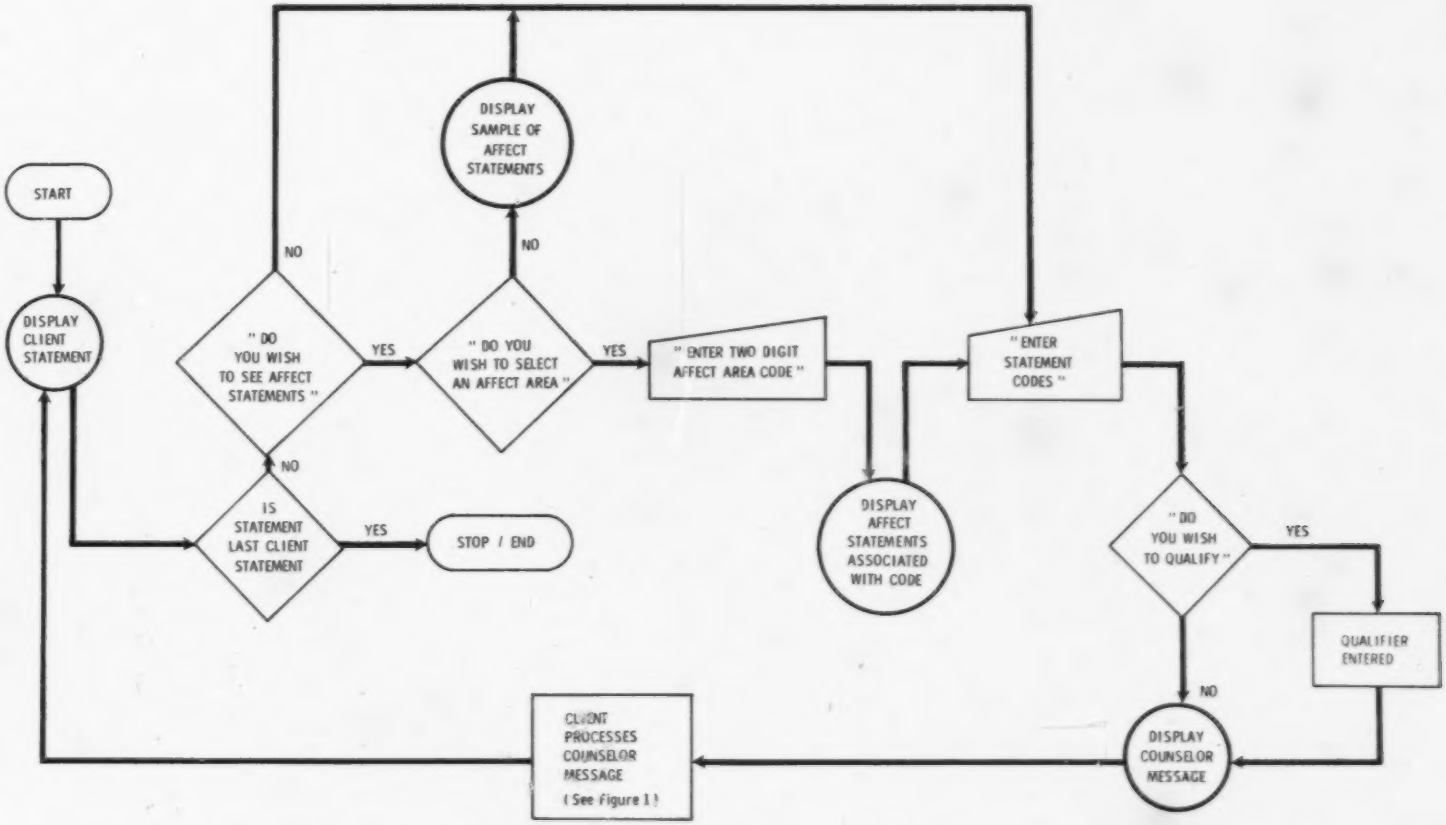


**FIGURE 2:**
**FLOWCHART FOR COUNSELOR MESSAGE GENERATION**

**FIGURE 3: TRACK I**

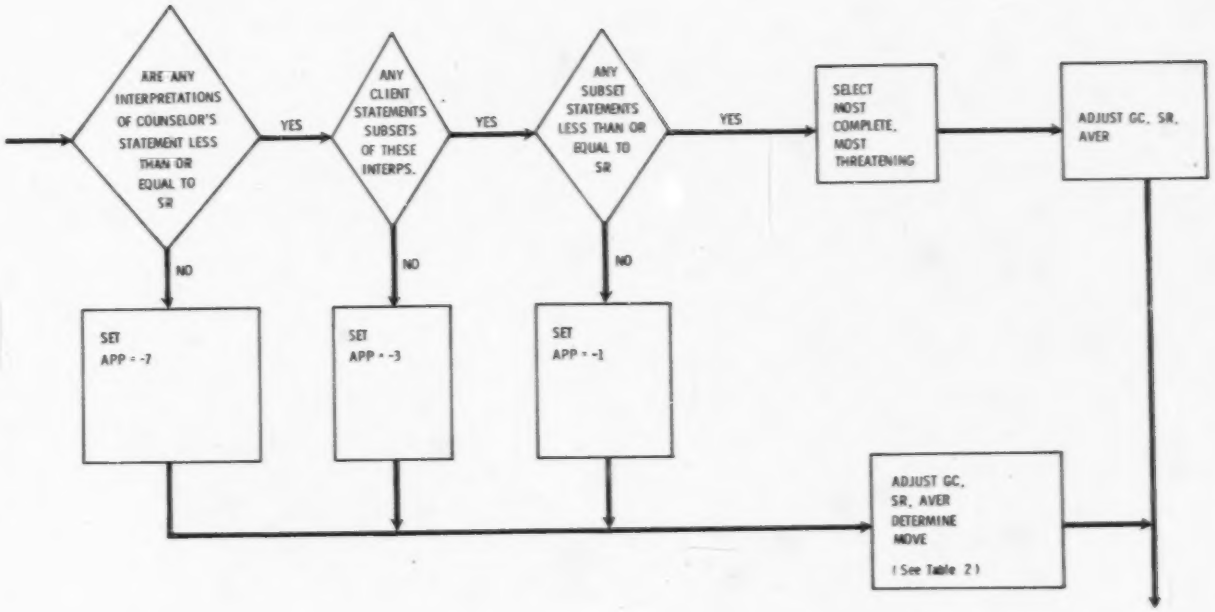
ARE ANY INTERPRETATIONS OF COUNSELOR'S STATEMENT LESS THAN OR EQUAL TO SR
YES
ANY CLIENT STATEMENTS SUBSETS OF THESE INTERPS.
YES
ANY SUBSET STATEMENTS LESS THAN OR EQUAL TO SR
YES
SELECT MOST COMPLETE, MOST THREATENING
ADJUST GC, SR, AVER
NO
SET APP = -7
NO
SET APP = -3
NO
SET APP = -1
ADJUST GC, SR, AVER DETERMINE MOVE (See Table 2)

**FIGURE 4: TRACK II**

# APPENDIX

GENERATION OF COUNSELOR STATEMENTS

```
CL:    WORK SEEMS TO BE GOING OK FOR ME MOST OF THE TIME,
       BUT SOMETIMES I HAVE SOME TROUBLE COPING WITH IT.

DO YOU WISH TO SEE AFFECT STATEMENTS?
? Y
DO YOU WISH TO SELECT AN AFFECT AREA?
? Y
ENTER TWO DIGIT AFFECT AREA CODE
? 05

          05  FRUSTRATION
          24  WOUND UP INSIDE
          25  OVERWHELMED
          26  A KNOT IN YOUR STOMACH
          29  TENSE
          36  EASILY IRRITATED AND READY TO SNAP
          37  UNDER A HEAVY BURDEN
          47  A DESIRE TO CHANGE THE SITUATION
          54  A SENSE OF BEING TRAPPED
          55  JUMPY AND JITTERY
          56  LET DOWN
          57  HYPERSENSITIVE
          59  YOUR BLOOD PRESSURE GO UP
          73  A SENSE OF ALONENESS
          74  THAT YOU'LL EXPLODE
          75  UNABLE TO COPE
          76  A DESIRE TO STRIKE OUT
          77  SORRY FOR YOURSELF
          78  A CHURNING INSIDE
ENTER STATEMENT CODES
  LE AF PR CO PR PE
? 01 75 04 05 00 00
DO YOU WISH TO QUALIFY?
? N

CO:    YOU FEEL UNABLE TO COPE WITH WORK SITUATION.

CL:    MY JOB DOES HAVE ITS PROBLEMS.

DO YOU WISH TO SEE AFFECT STATEMENTS?
? N
ENTER STATEMENT CODES
  LE AF PR CO PR PE
? 03 05 04 05 00 00
DO YOU WISH TO QUALIFY?
? Y

CO:    I THINK IT WOULD BE A GOOD IDEA IF YOU COULD
       TELL ME ABOUT FRUSTRATION WITH WORK SITUATION.
```

SAMPLE INTERVIEW I

CL: WORK SEEMS TO BE GOING OK FOR ME MOST OF THE TIME, BUT SOMETIMES I HAVE SOME TROUBLE COPING WITH IT.

CO: YOU FEEL A SENSE OF UNCERTAINTY ABOUT WORK SITUATION.

CL: THE TROUBLE IS THAT I'M CAUGHT IN THE WORK SITUATION AND I DON'T KNOW WHAT TO DO.

CO: I AM NOT SURE, BUT I THINK YOU FEEL ANXIETY ABOUT WORK SITUATION

CL: I ESPECIALLY FEEL THIS WAY WHEN I WORK AROUND THE SECRETARIES.

CO: YOU FEEL TENSE WITH SECRETARIES.

CL: WHEN I'M AROUND THE SECRETARIES, I'M UNCERTAIN OF JUST HOW TO ACT. . . WHAT TO DO.

CO: YOU'RE TELLING ME ABOUT A SENSE OF UNCERTAINTY ABOUT BEHAVIOR WITH SECRETARIES.

CL: I GUESS IT'S NOT ALL THE SECRETARIES THOUGH. . . I FEEL MOST TENSE AROUND MY OWN SECRETARY.

CO: I THINK IT WOULD BE A GOOD IDEA IF YOU COULD TELL ME ABOUT ANXIETY ABOUT SECRETARY.

CL: I REALLY FEEL WOUND UP WHEN I HAVE TO WORK AROUND MY SECRETARY.

CL: IT'S NOT THAT SHE'S A BAD SECRETARY. . .IN FACT, IN SOME WAYS SHE MAKES ME FEEL KIND OF SECURE AT WORK.

CO: I AM NOT SURE, BUT I THINK YOU FEEL AFFECTION FOR SECRETARY.

CL: YOU KNOW, IT'S STRANGE BUT I WANT TO BE AROUND HER MORE AND MORE OF THE TIME.

CL: IT'S WHEN I GET TO FEELING THOSE THINGS ABOUT MY SECRETARY THAT I GET ALL WOUND UP INSIDE.

SAMPLE INTERVIEW II

CL: WORK SEEMS TO BE GOING OK FOR ME MOST OF THE TIME, BUT SOMETIMES I HAVE SOME TROUBLE COPING WITH IT.

CO: I AM NOT SURE, BUT I THINK YOU FEEL WOUND UP INSIDE.

CL: GENERALLY, WORK IS ALL RIGHT. SOMETIMES I HAVE TROUBLE WITH IT.

CO: I THINK IT WOULD BE A GOOD IDEA IF YOU COULD TELL ME ABOUT FRUSTRATION WITH WORK SITUATION.

CL: MY JOB DOES HAVE ITS PROBLEMS.

CO: TELL ME ABOUT PROBLEM(S).

CL: MY WORK HAS BEEN CAUSING ME SOME PROBLEMS.

CO: TELL ME ABOUT WORK SITUATION.

CL: MY JOB PRESENTS SOME DIFFICULTIES.

CO: YOU FEEL FRUSTRATION ABOUT WORK SITUATION.

CL: SOMETIMES I FEEL KIND OF TRAPPED BY MY WORK.

CO: YOU'RE TELLING ME ABOUT A SENSE OF BEING TRAPPED BY WORK SITUATION.

CL: LIKE, FOR INSTANCE, WORK DOESN'T PAY AS I'D LIKE IT TO, AND FINANCIALLY THINGS ARE GETTING OUT OF PROPORTION FOR ME.